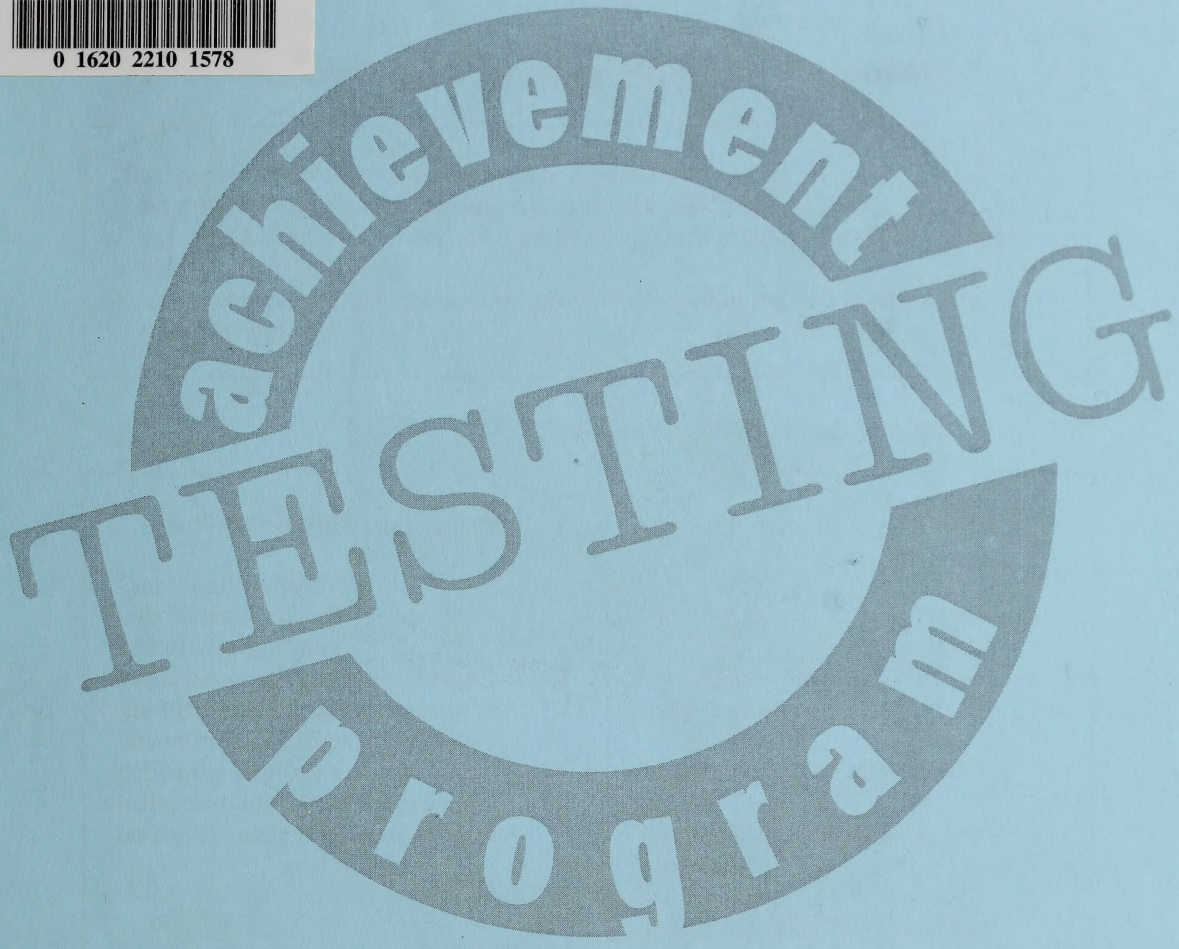


Information **Bulletin**

• Grade 9 Mathematics •

1999 – 2000 School Year

Alberta
LEARNING

This document was written primarily for:

Students	✓
Teachers	✓
Administrators	✓
Parents	
General Audience	
Others	✓ Superintendents

Distribution: This document is posted on our web site. Our Internet address is http://ednet.edc.gov.ab.ca.

This bulletin contains general information about the Achievement Testing Program and information specific to the Grade 9 Mathematics Achievement Test. **This bulletin replaces all previous bulletins.**

September 1999

Achievement Testing Program Purpose

The purpose of the Achievement Testing Program is to

- determine if students are learning what they are expected to learn
- report to Albertans how well students have achieved provincial standards at given points in their schooling
- assist schools, jurisdictions, and the province in monitoring and improving student learning

Enhance Student Learning

Careful examination and interpretation of the results can help identify areas of relative strength and weakness in student achievement. Teachers and administrators can use this information in planning and delivering relevant and effective instruction in relation to learning outcomes in the *Programs of Study*.

Enable Accountability

Alberta Learning and school jurisdiction personnel are responsible for ensuring that high-quality education is provided to all students in the province.

Information about achievement is provided to

- schools and jurisdictions
- parents
- the public

so that they may know how well students in their schools are meeting local targets and provincial expectations.

Interpreting Results

Achievement tests assess only part of what is to be learned. In addition, many factors contribute to student achievement. Personnel at the jurisdiction and school levels are in the best position to appropriately interpret, use, and communicate jurisdiction and school results in the local context.

General Information

The Achievement Testing Program provides teachers, parents, students, school administrators, Alberta Learning, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas in Grade 3—language arts and mathematics—and in four subject areas in grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing, field testing, and marking the assessment instruments. Teachers are also involved in setting assessment standards.

Reporting the Results

On August 25, 1999, each jurisdiction and school connected via extranet received, electronically, individual school reports and jurisdiction reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Two copies of an individual profile for each student will be sent to the school that the student will attend in September. We expect that the Parent Copy will be given to parents and the School Copy will remain with the student's record.

Administering the Tests

Information about the nature of the provincial assessments as well as their administration to students requiring special provisions can be found in the *General Information Bulletin, Achievement Testing Program,* which is distributed to all school principals and is posted on the Alberta Learning web site http://ednet.edc.gov.ab.ca.

Principals should refer to the *Principal's Manual* for specific information regarding schedules, security, rules, responsibilities, policies, and the administration of all achievement tests.

Teachers can refer to the *Teacher's Manual* for specific information regarding procedures for administering all achievement tests and the local marking of the written response for Language Arts achievement tests.

Students in Francophone and French Immersion Programs

All students in Francophone and French Immersion programs must write English Language Arts, French Language Arts, and French versions of other achievement tests if their language of instruction is French. Alberta Learning will send a checklist to schools in January requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

The following achievement tests are secured:
ALL tests from 1998 and 1999

Standards: Curriculum, Assessment, Achievement

Definitions

The Achievement Testing Program is directly concerned with three different but related standards. These provincial standards are curriculum standards, assessment standards, and achievement standards.

- **Curriculum Standards** are the expected student learnings sequenced into grade levels. They include broad statements of knowledge, skills, and attitude expectations against which student performance is judged. These standards are established in the process of curriculum development and are found in the *Programs of Study* document produced for each subject.

- **Assessment Standards** are the criteria adopted for judging actual student achievement relative to curriculum standards. They are ultimately expressed in and applied to test scores. They are derived from answers to questions such as: what scores must a student obtain or how many questions on a given test must a student answer correctly in order for his/her performance on the test to be judged as acceptable or excellent?

- **Achievement Standards** are judgements that specify what percentages of students are expected to achieve an acceptable and an excellent level of achievement in relation to each course of studies; i.e., to the relevant curriculum standards. They reflect a community judgement about what is an appropriate expectation for students. It is important to point out that this judgement is not a prediction of the percentage of students who will actually achieve acceptable or excellent levels, but rather a specification of the percentage of students at a given grade or year in school who are *expected* to achieve the acceptable (85%) or excellent level (15%). **The 85% of students expected to meet the *acceptable standard* includes those students who meet the *standard of excellence***. These standards apply to school, jurisdiction, and provincial performance.

Local Targets and Planning

A target is an implicit part of any goal. A school's educational goals point the directions for people's efforts, but targets describe in specific terms what will be accomplished by a certain time. This allows people to assess whether they are heading where they intend to go, and how well they are moving toward their desired outcomes. Assessment of progress in relation to a target may also lead to the recognition that a different target would be more helpful in guiding a school's or jurisdiction's efforts toward a particular goal. By identifying immediate, reachable outcomes, targets encourage teachers, students, administrators, and their community to believe that distant goals are attainable.

Viewed in this way, targets can be a valuable part of a school board's education plan. The mission, mandate, values and beliefs, and long-range goals all provide a context for setting specific targets. Similarly, past accomplishments are helpful indicators of what specific targets may be most appropriate. This is why achievement test results, as well as results of various other local assessments, are relevant in target setting.

Focus

District targets for student achievement on the provincial achievement tests are a required part of a school board's education plan. These district targets provide a framework for each school in the district to use in setting local targets. However, the setting of specific targets by each school is necessary as part of a plan of action and as a

basis for assessing the effectiveness of local decisions about programs. District targets will be most helpful if they reflect the variations identified by the local targets set by individual schools.

Systematic interpretation of school results from provincial achievement tests will reveal where students need more help in order to continue learning successfully. This can be the beginning point for setting local targets for student performance on the tests in the next year or two. The provincial expectation that at least 85% of students will achieve the *acceptable standard* on each test indicates the long-term goal, but staff in each school should identify what percentage of their students reasonably can be expected to achieve the provincial standard on a particular test in a given year. An important part of this decision is agreeing on how resources and people can support the priorities that have been set locally.

Tips for Setting Local Targets

- Consider past and desired participation rates in achievement tests when setting targets for student performance on specific tests.
- Focus on a limited number of areas. For example, emphasize one or two subjects in which weaknesses in student performance are across grades. It may be reasonable to set "hold the line" targets in other areas temporarily.
- Work collaboratively across grades in a school. Students' performance on an achievement test reflects their learning over the years. Teachers in all grades can contribute important insights and assistance in setting targets.
- Use the school reports on achievement test results to identify which aspects of a subject need attention, and use this information to plan targets.
- Emphasize what students need in order to succeed, rather than focusing on problems that keep students from achieving at the levels expected provincially.
- Expect to set different targets in different grades and subjects, depending on past results and current priorities and resources.
- Work collaboratively at the district level, to identify areas of common strength or weakness across different schools and to determine targets for the district that can support all schools.
- Interpret targets for students so that they are part of the school-wide effort to achieve school targets. Inform parents, too.
- Report to students and parents on student achievement in relation to targets.

Targets in Perspective

Provincial tests, though providing a common standard and important information about students' learning, are only one of many indicators that should be used to evaluate the effectiveness of schools. School boards and individual schools may find it helpful to set targets related to other measures of student achievement and to areas other than student achievement. Examples of these include completion of programs, satisfaction reported by students or parents, collaboration of parents or others from the community, student involvement in the community, and other types of indicators reflecting local educational goals.

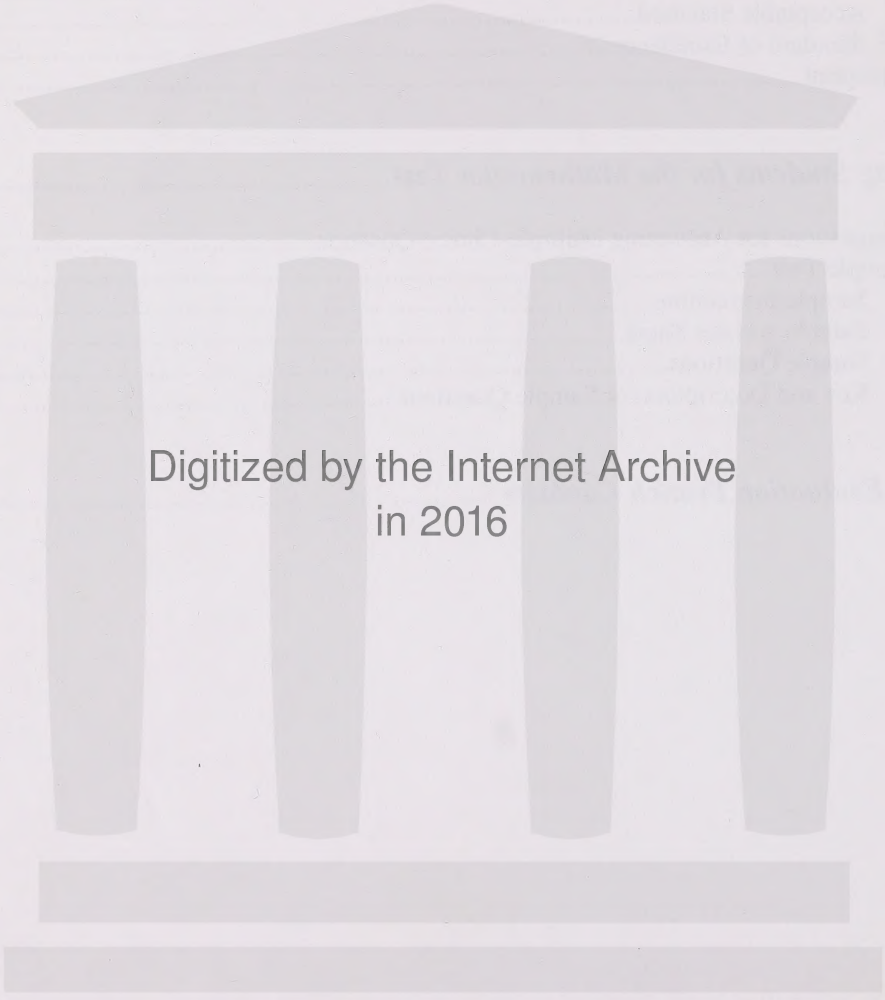
Through its targets, each school board or school, together with parents and members of the community, can highlight priorities that exist locally for a given year and can commit to achieving certain results. Insofar as target setting complements other strategies for improving student learning, targets are likely to contribute to student learning and to the overall effectiveness of schooling in the community.

Purpose of Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned English Language Arts and Mathematics by the end of Grade 3, and English Language Arts, Mathematics, Science, and Social Studies by the end of

Grade 6 and Grade 9. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing grades 3, 6, and 9 students in all types of school programs—public, private, and home education. By comparing actual results with provincial standards, decisions can be made about whether achievement is, in fact, "good enough."

Contents



Grade 9 Mathematics Assessment

General Description

The Grade 9 Mathematics Achievement Test consists of two sections:

- one section has 44 multiple-choice questions, each with a value of one mark
- the other section has 6 numerical-response questions, each with a value of one mark

The sections may be done in whatever order the student chooses.

The questions are integrated in narrative themes.

The test is developed to be completed in 90 minutes; however, students may take an additional 30 minutes to complete the test.

Students will require a scientific calculator, HB pencils, a ruler, and an eraser. See the link for the *Use of Calculators on Alberta Learning Achievement Tests*.

Students may also use manipulative materials when completing the test.

Reporting Categories

The following indicators briefly highlight the learnings for each reporting category.

Knowledge

- recalls facts, concepts, and terminology
- knows procedures for algorithms and computations, and for using formulas
- knows procedures for constructions, measurements, conversions, and order of operations
- knows mental computation and estimation strategies
- knows how to use calculators and computers

Skills

- applies basic mathematical concepts in familiar and unfamiliar situations
- demonstrates relationships among number systems, operations, number forms (fractions, decimals, powers, etc.), and concrete, pictorial, and symbolic representation
- demonstrates and applies relationships within equations and formulas
- demonstrates and applies relationships among geometric forms in a variety of situations
- demonstrates relationships between numbers and geometric forms
- uses a variety of strategies to solve problems
- applies data management skills to solve problems
- judges the reasonableness of a solution

Description of the Mathematics Assessment Standards

The following statements describe what is expected of Grade 9 students who are meeting the *acceptable standard* or the *standard of excellence* based on outcomes in the Program of Study. These statements represent the standards against which student achievement is measured. It is important to remember that one test alone cannot measure completely all of the outcomes in the Program of Study.

Acceptable Standard	*Standard of Excellence*
Students who meet the *acceptable standard* in Grade 9 Mathematics have a basic understanding of mathematical concepts, related procedures, and problem-solving applications. They can demonstrate understanding in concrete, pictorial, and symbolic modes, and translate from one mode to another. For example, students meeting the *acceptable standard* know that the solution to the equation $4(x + \frac{1}{2}) = -3$ is $x = -\frac{5}{4}$ and are able to demonstrate their understanding by explaining how this solution can be determined and what it means for the solution to be $-\frac{5}{4}$. They are able to communicate and verify the solution in any of the three modes.	Students who meet the *standard of excellence* in Grade 9 Mathematics have a superior understanding of mathematical concepts, related procedures, and applications in novel problem-solving situations. They are comfortable demonstrating their understandings in concrete, pictorial, or symbolic forms of representation. For example, they are able to show that a triangle maintains its shape and its size whenever it is reflected in either coordinate axis. They are able to demonstrate this property by determining measurements using the properties of congruent triangles, and by using the length properties of segments on Cartesian grids. They are able to create and generalize problem situations to illustrate concepts and to analyze and explain relationships among concepts.
To meet the *acceptable standard*, students explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models of representation.	To meet the *standard of excellence*, students model mathematical situations clearly, using oral, written, concrete, pictorial, graphical, and algebraic methods. They are expected to understand mathematical questions presented with objects, diagrams, or symbols in both common and unusual contexts.
Students meeting the *acceptable standard* perform the mathematical operations and procedures that are fundamental to mathematics in Grade 9 and apply what they know to solving straightforward problems in familiar settings. They are able to describe the steps they used to solve a particular problem, and they can verify and defend their solution to the problem.	Students meeting the *standard of excellence* perform the mathematical operations and procedures that are fundamental to mathematics in Grade 9 and apply mathematical thinking and modeling to solve and create non-routine problems. They are able to clearly describe the steps that they or other students used to solve a particular problem and can suggest alternative procedures and/or solutions. They are able to generalize solutions and strategies to new problem situations.
Students meeting the *acceptable standard* have a positive attitude about mathematics and a sense of personal competence in using mathematics. They demonstrate confidence when using common mathematical procedures and when applying problem-solving strategies in familiar settings.	Students meeting the *standard of excellence* have a positive attitude toward mathematics and show confidence in using mathematics meaningfully. They are self-motivated risk-takers who persevere when solving novel problems. They take initiative in trying new methods and are creative in their approach to problem solving.

Blueprint

The blueprint for mathematics outlines the content strands and reporting categories under which questions on the test are classified. The number of questions in each category is approximate.

General Outcomes*	Knowledge	Skills	Total Number of Questions
Number • Explain and illustrate the structure and the interrelationship of the sets of numbers within the rational number system • Develop a number sense of powers with integral exponents and rational bases • Use a scientific calculator or a computer to solve problems involving rational numbers • Explain how exponents can be used to bring meaning to large and small numbers, and use calculators or computers to perform calculations involving these numbers	**4**	**9**	**13 (26%)**
Patterns and Relations • Generalize, design, and justify mathematical procedures, using appropriate patterns, models, and technology • Solve and verify linear equations and inequalities in one variable • Generalize arithmetic operations from the set of rational numbers to the set of polynomials	**4**	**11**	**15 (30%)**
Shape and Space • Use trigonometric ratios to solve problems involving a right triangle • Describe the effects of dimension changes in related 2-D shapes and 3-D objects in solving problems involving area, perimeter, surface area, and volume • Specify conditions under which triangles may be similar or congruent, and use these conditions to solve problems • Use spatial problem solving in building, describing, and analyzing geometric shapes • Apply coordinate geometry and pattern recognition to predict the effects of translations, rotations, reflections, and dilatations on 1-D lines and 2-D shapes	**5**	**9**	**14 (28%)**
Statistics and Probability • Collect and analyze experimental results expressed in two variables, using technology, as required • Explain the use of probability and statistics in the solution of complex problems	**3**	**5**	**8 (16%)**
Total Number of Questions	**16 (32%)**	**34 (68%)**	**50 (100%)**

*From the *Alberta Program of Studies for K–9 Mathematics,* June 1996

Preparing Students for the Mathematics Test

The best way to prepare students for writing the achievement tests is to teach the curriculum well and to ensure that children know what is expected. Many of the skills and attitudes that support test writing are in fact good skills and strategies for approaching all kinds of learning tasks.

Have students do the sample questions included in this bulletin. Then, have students share strategies they used to answer the questions.

Teachers are also encouraged to share the following information with their students to help them prepare for the Grade 9 Mathematics Achievement Test.

Suggestions for Answering Multiple-Choice Questions

- Before you begin, find out:
  - how much time you have
  - if you can use a calculator, tables, diagrams, manipulatives, etc.
- Ask questions if you are unsure of anything.
- Skim through the whole test before beginning. Find out how many questions there are and plan your time accordingly.
- Answer the easier questions first, then go back to the harder ones.
- Do not spend too much time on any one question. Make a note (*or ?) beside the question and go back to it if you have time.
- Read each question carefully, underline key words, and try to think of an answer before looking at the choices.
- Read all the choices and see which one best fits the answer.
- When you are not sure which answer is correct, cross out any choices that are wrong, then pick the choice that is best.
- Guess if you don't know the right answer. Answer all questions—there is no penalty for guessing.
- If time permits, recheck your answers.
- Double check to make sure you have answered everything before handing in the test.
- Notice that the questions on the mathematics test are organized in narrative themes.
- Read the information given using the strategy that works best for you. You should either
  - look at all the information and think carefully about it before you try to answer the questions **OR**
  - read the questions first and then look at the information, keeping in mind the questions you need to answer.
- Make sure you look at all forms of the information given. Information may be given in words, charts, pictures, graphs, and maps.
- When information is given for more than one question, go back to the information before answering each question.
- Check your work when you calculate an answer, even when your answer is one of the choices.

For further suggestions, see *Teaching Students with Learning Disabilities*, Alberta Learning, Special Education Branch, pages LD 122 to 124.

Sample Test

The following sample questions reflect the nature and complexity of the questions that will appear on the Grade 9 Mathematics Achievement Test.

Teachers are encouraged to familiarize their students with the types of questions that will appear on the achievement test by having them work through the sample questions.

This collection of sample questions does not represent the test emphasis as presented in the blueprint.

A sample answer sheet for the numerical-response questions is provided so that students can familiarize themselves with this form.

The key and descriptors for the sample questions are on page 19.

The sample questions that appear on pages 9 to 18 are from field tests and the 1999 Achievement Test (all other questions on this test are secured). For more practice with the various types of multiple-choice and numerical-response questions, refer to previous Grade 9 Mathematics Information Bulletins.

Sample Instructions

- You are expected to provide your own scientific calculator.
- Be sure that your calculator is in degree (DEG) mode.
- Manipulatives may be used for this test.
- Use **only** an **HB** pencil to mark your answer.
- Read each question carefully.
- If you change an answer, **erase** your first mark **completely**.
- Try to answer every question.
- **You may write in this booklet, if you find it helpful. Make sure your answers are placed on the answer sheet.**
- Now turn this page and read detailed instructions for answering multiple-choice and numerical-response questions.

Multiple Choice

- Each question has four possible answers from which you are to choose the **correct** or **best** answer.

Example

If $x = 3$, what is the value of $x + 8$?

A. 10
B. 11
C. 12
D. 13

Answer Sheet

Ⓐ ● Ⓒ Ⓓ

- Locate the question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

Numerical Response

- Record your answer on the answer sheet provided by writing it in the boxes and then filling in the corresponding circles.

- Enter the first digit of your answer in the left-hand box and leave any unused boxes blank.

Example 1

If $(4^x)^3 = 4^{18}$, what does x equal?

Record your answer in the numerical-response section on the answer sheet.

Solution:

$(4^x)^3 = 4^{18}$

$4^{3x} = 4^{18}$

$3x = 18$

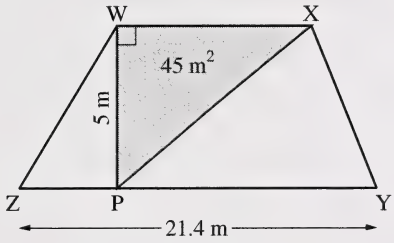
$x = 6$

Record 6 on the answer sheet →

Example 2

James had a garden in the shape of a triangle. He knows its area and the length of one of its sides. This year, he enlarged the garden to form a trapezoidal shape. He knows the length of its longest side.

$$\text{Area of trapezoid} = \frac{h(a+b)}{2}$$



What is the total area of his garden now?

Record your answer in the numerical-response section on the answer sheet.

Solution:

$$\text{Area of triangle} = \frac{ab}{2}$$

$$\text{Area of triangle} = \frac{(WP)(WX)}{2}$$

$$45\ \text{m}^2 = \frac{(5\ \text{m})(WX)}{2}$$

$$WX = \frac{2(45\ \text{m}^2)}{5\ \text{m}}$$

$$WX = 18\ \text{m}$$

$$\text{Area of trapezoid} = \frac{h(a+b)}{2}$$

$$= \frac{WP(WX + ZY)}{2}$$

$$= \frac{5\ \text{m}(18\ \text{m} + 21.4\ \text{m})}{2}$$

$$= \frac{5\ \text{m}(39.4\ \text{m})}{2}$$

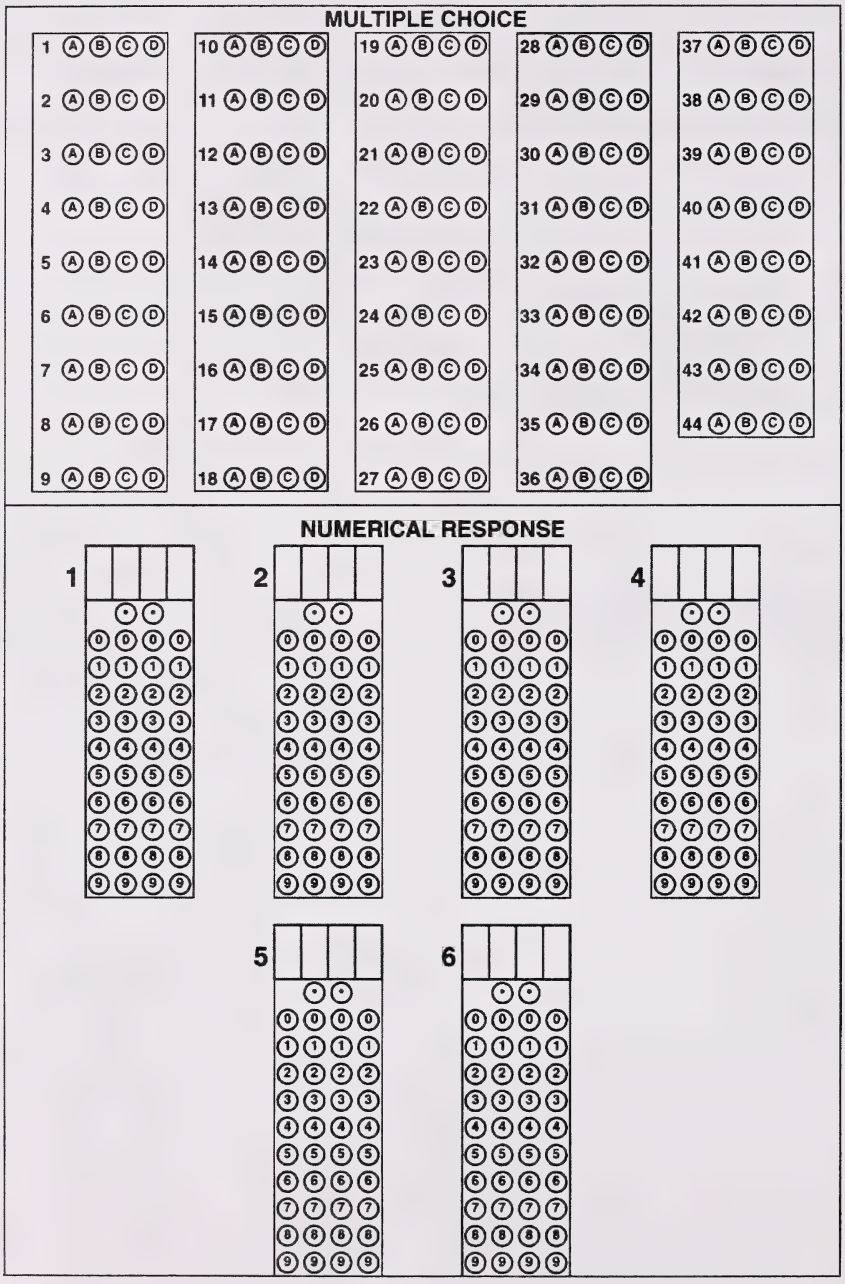
$$= \frac{197\ \text{m}^2}{2}$$

$$= 98.5\ \text{m}^2$$

The area of the new garden is $98.5\ \text{m}^2$.

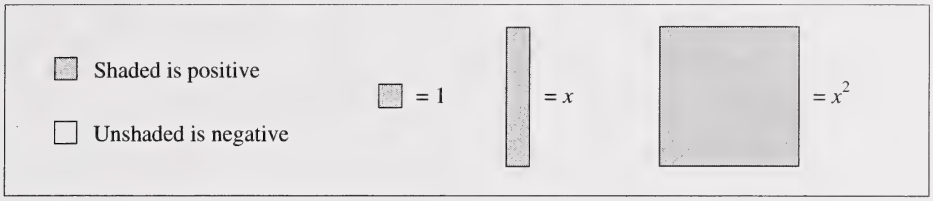
Record 98.5 on the answer sheet →

Sample Answer Sheet

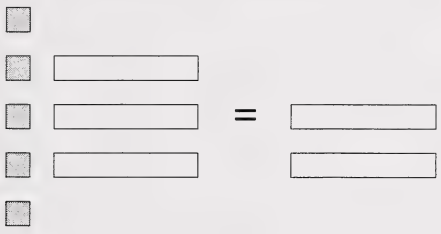


Connections within Mathematics

Use the following algebra-tiles legend when answering question 1.



1. What equation is represented by the diagram below?



A. $-5 + 3x = 2x$

B. $5 - 3x = -2x$

C. $-5 - 3x = -2x$

D. $5 + 3x = -2x$

---

2. If $x^2 = 64$, then x equals

A. 32 or –32

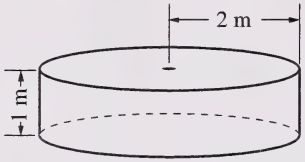
B. 8 or –8

C. 8 only

D. 32 only

Use the following information to answer question 3.

At the end of the day, Pat relaxes in a hot tub that is the shape of a cylinder. The hot tub has a radius of 2 m and depth of 1 m. The formula for the volume of a cylinder is $V = \pi r^2 h$.



3. If the radius of the tub is doubled, then the volume will be

A. halved
B. doubled
C. increased four times
D. increased eight times

---

4. Which of the following transformations does **not** maintain congruency between the object and its image?

A. Reflection
B. Rotation
C. Translation
D. Dilatation

5. The formula $V = \frac{1}{3}\pi r^2 h$ is used to determine the volume of a cone-shaped paper cup. To what set of numbers does π belong?

A. Natural numbers
B. Irrational numbers
C. Rational numbers
D. Imaginary numbers

6. To determine lane position in a race, 8 runners put their names in a hat. There are 3 runners from the same team. What is the probability that the first name pulled from the hat will be that of a runner from this team?

A. $\frac{1}{3}$

B. $\frac{1}{8}$

C. $\frac{5}{8}$

D. $\frac{3}{8}$

7. One of Joe's drawers contains ten identical red socks and ten identical blue socks. If Joe does not look in the drawer, what is the least number of socks he must remove from the drawer before he is certain of getting a matched pair?

A. 2

B. 3

C. 10

D. 11

8. The expression $9x^2y^2 \div (-3xy)$ is equivalent to

A. $-3x^2y$

B. $3xy^2$

C. $3xy$

D. $-3xy$

9. At the airport, your friend Michael goes to a gift shop with \$45.00. He spends $\frac{2}{3}$ of his money on a new shirt. He spends $\frac{1}{5}$ of the remaining money on a Logic Puzzle Magazine. How much money does Michael have left?

A. \$6.00
B. \$12.00
C. \$24.00
D. \$30.00

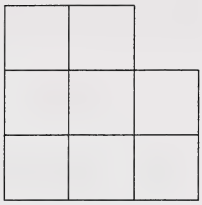
10. In the second puzzle, two buses leave from a particular gas station at the same time. One bus travels east at 90 km/h. The other bus travels west at 100 km/h. How long will it take before the buses are 570 km apart?

A. 6 h
B. 5.7 h
C. 3 h
D. 1.5 h

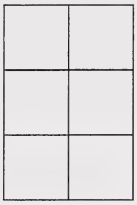
School Activities

Use the following information to answer question 11.

You stack some cube-shaped boxes of sports equipment in the school storage room. Three elevation views of your stack and its base plan are shown below.

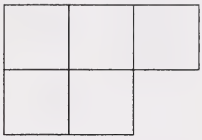


Front elevation view



Left elevation view

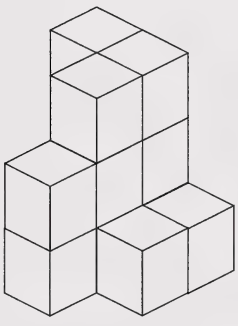
Right elevation view



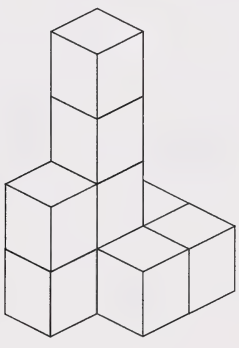
Base plan

11. Which of the following 3-D diagrams represents your stack of boxes?

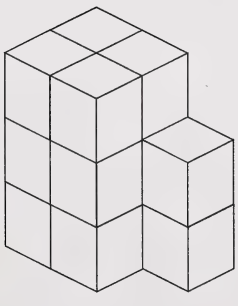
A.



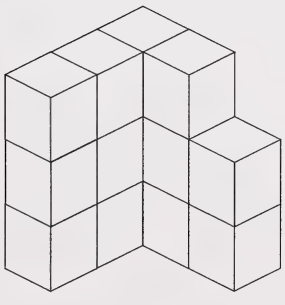
B.



C.



D.



12. In the school storage room, a tennis racket and a ski pole are both leaning against a wall at the same angle. The tennis racket's length is 60.0 cm, and it touches the floor 30.0 cm away from the wall. The ski pole touches the floor 67.5 cm away from the wall. What is the length of the ski pole?

A. 33.8 cm

B. 37.5 cm

C. 124 cm

D. 135 cm

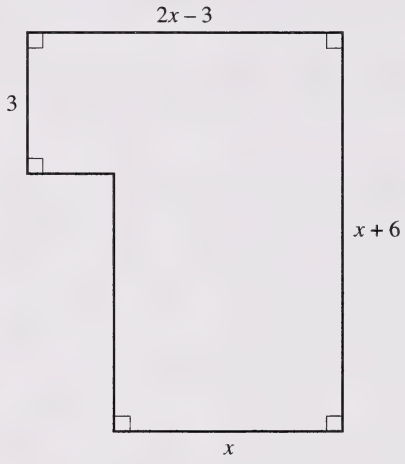
13. The school cafeteria is going to be carpeted. A diagram of the cafeteria is shown below. Which of the following expressions represents the area of the cafeteria?

A. $x^2 - 9$

B. $6x - 9$

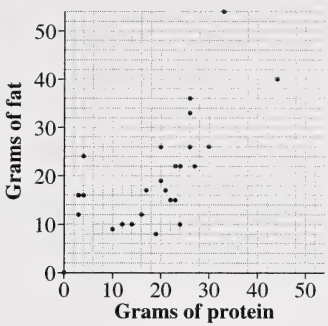
C. $x^2 + 9x - 9$

D. $3x^2 + 9x - 27$



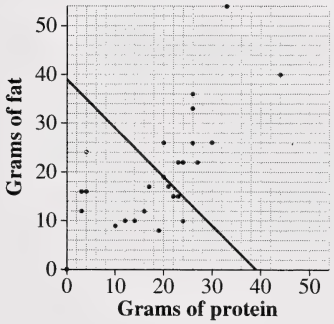
Use the following information to answer question 14.

The following scatter plot shows information from a study of the protein and fat contents of popular food items sold at the school cafeteria.

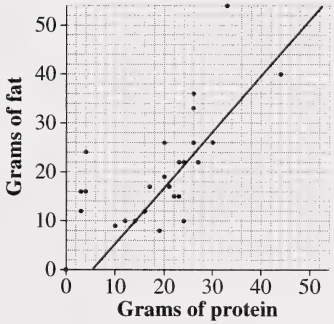


14. Which of the following graphs shows the **most reasonable** line of best fit for the information presented?

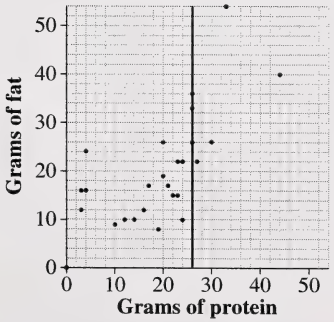
A.



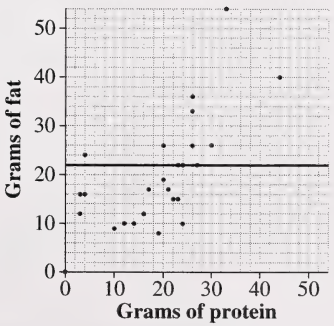
B.



C.



D.



15. In the school cafeteria, you purchase a can of juice that has a height of 16 cm and a diameter of 6 cm. The formula for the volume of a cylinder is $V = \pi r^2 h$. How much juice could the can hold?

A. 301 mL
B. 452 mL
C. 576 mL
D. 1 809 mL

16. In the cafeteria, Amber sold an average of $32.50 worth of chocolates each day over a five-day period. In the first four days, her sales were $39.00, $12.75, $16.75, and $28.50. What were Amber's chocolate sales on the fifth day?

A. $8.25
B. $24.25
C. $64.50
D. $65.50

You have now completed the multiple-choice questions.
Proceed directly to the numerical-response questions.

Numerical-Response Questions

Use the following information to answer question 1.

The members of a student council held a school dance. The DJ they hired charges a basic fee of $300 and an additional charge of $1.50 per student that attends the dance.

1. If the DJ charged the student council $487.50, how many students attended the dance?

Record your answer in the
numerical-response section on the answer sheet.

Use the following information to answer question 2.

A diver steps off a diving board. The time in seconds (t) that it takes her to hit the water is related to the distance in metres (d) from the diving board to the surface of the water. The formula that can be used to calculate the distance from the diving board to the surface of the water is

$$d = 4.9t^2$$

2. If it takes the diver 0.6 seconds to hit the water, the distance from the diving board to the surface of the water is _____ m. (Round your answer to the nearest hundredth of a metre.)

Record your answer in the numerical-response section on the answer sheet.

Multiple-Choice Questions

Item	Key	Reporting Category*	Program Strand**	Curriculum Standard
1	B	S	PR	Identify an equation presented pictorially
2	B	K	N	Demonstrate concepts of positive and negative square roots
3	C	K	SS	Calculate the effect of a change in radius on the volume of a cylinder
4	D	K	SS	Recognize transformations that maintain congruency between the object and image
5	B	K	N	Identify whether or not a number is rational
6	D	K	SP	Carry out a strategy to solve a novel problem
7	B	K	SP	Calculate probability
8	D	K	PR	Divide a monomial by a monomial
9	B	S	N	Solve a problem using rational numbers in a meaningful context
10	C	S	PR	Apply logic and patterns to solve a problem
11	C	S	SS	Determine a 3-D object given its plan and elevation views
12	D	S	SS	Apply properties of similar triangles
13	C	K	PR	Carry out operations on polynomial expressions
14	B	S	SP	Determine line of best fit from a scatter plot
15	B	K	SS	Calculate the volume of a cylinder
16	D	S	SP	Apply understanding of mean to solve a word problem

Numerical-Response Questions

Item	Key	Reporting Category*	Program Strand**	Curriculum Standard
NR1	125	S	PR	Solve a problem that can be represented with a first degree equation
NR2	1.76	K	N	Solve an equation given the value of a variable

* K—Knowledge; S—Skills

** N—Number; PR—Patterns and Relations; SS—Shape and Space; SP—Statistics and Probability

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Appendix E

Use of Calculators on Achievement Tests

Rationale

Recent changes in the *Program of Study* for mathematics require students to become familiar with the use of a calculator in order to complete complex computations or verify solutions to problems. The increased availability of technology in schools helps students to solve complex, real-life multistep problems.

Questions on future Grade 9 Mathematics achievement tests will include real-life problems involving more than a single step. Students will need to use a scientific calculator when writing the Grade 9 Mathematics Achievement Test; trigonometric tables will not be provided. Tests are constructed to ensure that the use of particular models of calculators neither advantages nor disadvantages individual students.

Definition

For the purpose of the Achievement Testing Program a scientific calculator is considered to be a handheld device designed for complex mathematical computations. Included in this definition are calculators having the capabilities of performing calculations involving square root, sine, cosine, and tangent. Calculators that have more sophisticated features such as graphing capabilities, built-in formulas, mathematical functions, or other programmable capabilities are included in this definition, but are not required in Grade 9 Mathematics.

Policy

Grade 9: To ensure equity and fairness for all students and compatibility with the provincial *Program of Study*, Alberta Learning **expects** students to use scientific calculators, as defined above, when writing the Grade 9 Mathematics Achievement Test.

Grade 6: Those Grade 6 students for whom the four-function calculator is a familiar classroom tool **are encouraged**, **but not required**, to use a calculator when writing the Grade 6 Mathematics Achievement Test Part B; however, they **shall not** use calculators when writing Part A.

Grade 3: From their early years in school, students are expected to become increasingly familiar with calculators and confident in using them to solve problems. Nevertheless, students need to have mastered basic addition facts (to 18), subtraction facts (to 18), and multiplication facts (to 49). To respect this principle as well as the problem-solving nature of the new curriculum, there will be two components to the Grade 3 Mathematics Achievement Test. Those students for whom the four-function calculator is a familiar classroom tool **are encouraged, but not required**, to use a calculator when writing the Grade 3 Mathematics Achievement Test Part(ie) B; however, they **shall not** use calculators when writing Part(ie) A.

Procedures

1. Teachers must, at the beginning of the Grade 9 year, advise students that a scientific calculator is **required** when writing the achievement test in mathematics.

2. Grade 9 students should be thoroughly familiar with the calculator that they will use when writing the Grade 9 Mathematics Achievement Test.

3. Although a scientific calculator is not specifically required in Grade 9 science, it may be used by students when writing the Grade 9 Science Achievement Test.

4. Teachers must also advise students in advance that they must clear all information that is stored in the programmable or parametric memory of calculators, both graphing and scientific, that are brought into the achievement test.

5. Calculators that have built-in notes (definitions or explanations in alpha notation) that cannot be cleared are not permitted.

6. Students must not bring to the test external devices that support calculators. Such devices include manuals, printed or electronic cards, printers, memory expansion chips or cards, external keyboards, or any annotations outlining operational procedures for scientific calculators.

7. The type of calculator that Grade 6 students use when writing achievement tests should be consistent with their skills and abilities. A scientific calculator is neither required nor recommended for Grade 6 students.

8. Students may bring extra calculators and batteries into the test room. The school may also provide extra calculators and batteries in case of calculator failure.

9. During achievement tests, supervising teachers must ensure that
   - all calculators operate in silent mode
   - no information is stored in the programmable or parametric memory of the calculators
   - students do not share calculators or the information contained within them
   - calculator cases are stored on the floor throughout the test
   - all test rules are followed

10. If you have any questions or comments about the use of calculators on achievement tests, contact Don Hollands, Science Examiner, or Daryl Chichak, Mathematics Assessment Specialist. Telephone 780-427-0010 or toll-free 310-0000, or fax 780-422-3206, or e-mail dhollands@edc.gov.ab.ca or dchichak@edc.gov.ab.ca.

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